

REMARKS

I. Amendments

Independent claim 1 is amended to provide additional clarity to the claimed invention by deleting certain unneeded language, adding clarification text, and inserting certain additional limitations. Language specifying that the gas stream to be treated must contain a high ratio of mercaptans to hydrogen sulfide is added to claim 1 to help make it clearer that the claimed process is uniquely provided to solve the problems associated with the removal of sulfur from these type of gas streams. Support for this limitation is found in the specification at paragraphs [0011] and [0013] of the published application.

Dependent claims 4, 9, 10, 11, and 12 were amended to cure questions of clarity and to address the Examiners claim objections and §112 rejection.

Independent claim 14 is amended to add the limitation that the gas stream is to have a high ratio of mercaptan to hydrogen sulfide. Support for this limitation is found in paragraphs [0011] and [0013] of the specification.

Dependent claim 18 is amended to address the Examiner's objection thereto.

The Abstract is replaced with one which is more clear and concise.

II. Claim Objections

It is submitted that the Examiner's objections have been addressed by the above-discussed amendments.

III. §112 Rejections

It is submitted that the Examiner's §112 rejection has been addressed by the amendment of claim 11.

IV. §103 Rejection of Claims 1-20 over GB 2,275,625 to Taylor

The Taylor publication discloses a two-step process for removing hydrogen sulfide and organic sulfur compounds, such as mercaptans, from a gas stream. See page 1, lines 1-15 of Taylor. The gas stream can contain up to 500 ppmv mercaptans. See page 1, lines 9-12 of Taylor. The first step uses a regenerable aqueous absorbent that is an aqueous solution of a chemical

absorbent and a physical absorbent to treat the gas stream to provide a treated gas stream, and the second step uses a solid adsorbent that is a molecular sieve, such as zeolites of the types 5A and 13X, to remove organic sulfur compounds from the treated gas stream of the first step. See page 1, line 15 – page 2, line 8 of Taylor. The Taylor publication does not recognize the treatment of gas streams that have a particularly high concentration of mercaptan to hydrogen sulfide and the need to use a particular type of washing solution in combination with molecular sieves to treat such a gas stream to provide a treated gas having an significantly reduced hydrogen sulfide content.

The Examiner argues that the applicant's recited gas stream composition is inherently the same as that of the natural gas that is treated by the Taylor process that utilizes two process steps similar to those of the applicant's invention. The Examiner further argues that the applicant's limitations concerning the composition of the washing solution are merely obvious ranges for process parameters that can be found by routine experimentation.

It is respectfully submitted, however, that the gas stream of the applicant's process is not typical of all natural gas streams. Instead, it has a composition and properties that are not generally found in all gas streams and which make the treatment of the specified gas stream particularly difficult. As is noted in the specification, the inventive process is particularly suitable for the removal of mercaptans from a gas feed stream that contains a high ratio of mercaptans-to-hydrogen sulfide. See the published specification at paragraphs [0011] and [0013]. The specification also notes the difficulty in the treatment removal of certain types of mercaptans from gas streams by absorption methods. See paragraph [0011].

In view of the unique composition of the gas stream of having a high mercaptan-to-hydrogen sulfide content and difficult to remove species of mercaptan compounds, the specifically defined absorption solution of the applicant's process for use in the absorption treatment of this type of gas stream is clearly not obvious. There is nothing in the Taylor teachings to indicate that an aqueous washing solution having the applicant's specifically claimed composition is required in order to effectively treat the claimed gas stream to adequately remove the sulfur therefrom. The Taylor publication furthermore does not inherently disclose the applicant's claimed gas stream composition; because, not all natural gas streams contain mercaptan species that are particularly difficult to remove by absorption techniques or high

concentration ratios of mercaptan-to-hydrogen sulfide. Thus, the Taylor publication fails to disclose or teach all the limitations of the applicant's claimed invention.

Other features that are claimed in the dependent claims of the applicant's invention are not taught by the Taylor publication. For instance, not disclosed are the limitations of claims 9 and 16 that are directed to cooling of the washed gas stream and removal of condensate therefrom prior to passing the washed gas stream to the molecular sieve adsorption step.

Considering that the Taylor reference fails to disclose, either specifically or inherently, each and every limitation of the applicant's claimed invention and that there is no cited reference that may be used to modify the Taylor reference in order to supply the missing limitations, the claimed invention is clearly unobvious over this reference. Moreover, there is no recognition by the Taylor reference of the particular problems and difficulty associated with the removal of sulfur from a gas stream that contains difficult to remove species of mercaptan and a high ratio of mercaptan-to-hydrogen sulfide.

Considering the above comments and amendments to the pending claims, the applicant respectfully requests the withdrawal of the Examiner's rejection and early allowance of claims 1-20.

Respectfully submitted,

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